

# **EXHIBIT 6**

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*Innovus Prime LLC*

**IN THE UNITED STATES DISTRICT COURT  
 FOR THE NORTHERN DISTRICT OF CALIFORNIA**

<p><b>Innovus Prime LLC</b></p> <p>Plaintiff</p> <p>v.</p> <p>(1) LG Electronics Inc.                  (2) LG Electronics U.S.A. Inc.                  (3) LG Electronics MobileCom                  U.S.A., Inc                  (4) Pixelworks, Inc.                  (5) Zoran Corporation                  (6) Toshiba Corporation                  (7) Toshiba America, Inc.                  (8) Panasonic Corporation                  (9) Panasonic Corporation of North                  America                  (10) Mitsubishi Electric Corporation                  (11) Mitsubishi Electric Visual                  Solutions America                  (12) Mitsubishi Digital Electronics                  America, Inc.                  (13) Vizio, Inc.                  (14) Sharp Corporation                  (15) Sharp Electronics                  Manufacturing Company of America                  Inc.                  (16) Sharp Electronics Corporation                  (17) Funai Electric Co. Ltd                  (18) Funai Corporation, Inc</p> <p>Defendants.</p>	<p>Civil Action No. <u>11- 04223</u></p> <p><b>FIRST AMENDED COMPLAINT FOR                  PATENT INFRINGEMENT</b></p> <p><b>DEMAND FOR JURY TRIAL</b></p>
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**FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT**

Plaintiff, Innovus Prime LLC, hereby alleges for its Complaint against LG Electronics Inc., LG Electronics U.S.A. Inc, LG Electronics MobileComm U.S.A. Inc, Pixelworks Inc., Zoran Corporation, Toshiba Corporation, Toshiba America Inc., Panasonic Corporation, Panasonic Corporation of North America, Mitsubishi Electric Corporation, Mitsubishi Electric Visual Solutions America, Mitsubishi Digital Electronics America, Inc., Vizio Inc., Sharp Corporation, Sharp Electronics Manufacturing Company of America, Inc., Sharp Electronics Corporation, Funai Electric Co., Ltd, and Funai Corporation, Inc. (collectively the “Defendants”) on personal knowledge as to its own actions and on information and belief as to the actions of others, as follows:

**NATURE OF THE CASE**

This is an action arising under the Patent Laws and Statutes of the United States in which Plaintiff seeks to recover for patent infringement, and for any and all damages and costs flowing there from.

**THE PARTIES**

1. Plaintiff Innovus Prime LLC is a Nevada limited liability company with a principal place of business at 900 Lafayette Street, Suite 708, Santa Clara, CA 95050.

2. On information and belief, Defendant LG Electronics, Inc. is a Republic of Korea limited company with its principal place of business in LG Twin Towers, 20 Yeouido-dong, Yeoungdeungpo-gu, Seoul, South Korea. On information and belief, LG Electronics, Inc. is a nonresident of California who engages in business in this state, but does not maintain a regular place of business in this state or a designated agent for service of process in this state. On information and belief, LG Electronics, Inc. resides in this jurisdiction within the meaning of 28

1 U.S.C. § 1400(b). This proceeding arises, in part, out of business done in this state. LG  
2 Electronics, Inc. may be served with process in Korea pursuant to the Hague Convention on the  
3 Service Abroad of Judicial and Extrajudicial Documents, Article 1, November 15, 1965 T.I.A.S.  
4 No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969). LG Electronics, Inc. regularly conducts and transacts  
5 business in California, throughout the United States, and within the Northern District of  
6 California, itself and/or through one or more subsidiaries, affiliates, business divisions, or business  
7 units.

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9 3. On information and belief, Defendant LG Electronics U.S.A., Inc. is a corporation  
10 organized and existing under the laws of the State of Delaware with its principal place of business  
11 at 1000 Sylvan Avenue, Englewood Cliffs, NJ 07632. This defendant is registered to do business  
12 in California and has appointed Corporation Service Company d/b/a CSC Lawyers Incorporating  
13 Service Company, 2730 Gateway Oaks Dr., Sacramento, CA 95833 as its agent for service of  
14 process. Defendant LG Electronics U.S.A., Inc. regularly conducts and transacts business in  
15 California, throughout the United States, and within the Northern District of California, itself  
16 and/or through one or more subsidiaries, affiliates, business divisions, or business units.

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18 4. On information and belief, Defendant LG Electronics MobileComm U.S.A, Inc. is  
19 a wholly owned subsidiary of LG Electronics, Inc. and is a corporation organized and existing  
20 under the laws of the State of California with its principal place of business at 920 Sylvan Avenue,  
21 Englewood Cliffs, New Jersey, 07632. This defendant has appointed Alan K. Tse, 10101 Old  
22 Grove Road, San Diego, California 92131 as its agent for service of process. Defendant LG  
23 Electronics MobileComm U.S.A., Inc. regularly conducts and transacts business in California,  
24 throughout the United States, and within the Northern District of California, itself and/or through  
25 one or more subsidiaries, affiliates, business divisions, or business units. LG Electronics, Inc., LG  
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1 Electronics U.S.A., Inc. and LG Electronics MobileComm U.S.A, Inc. will be referred to herein  
2 individually and collectively as "LG Defendants."

3         5. On information and belief, Defendant Pixelworks, Inc., is a corporation organized  
4 and existing under the laws of the State of Oregon with its principal place of business at 16760  
5 SW Upper Boones Ferry Rd., Ste 101, Portland, Oregon, 97224. This defendant has appointed  
6 AW Services, Inc. c/o Ater Wynne LLP, 1331 NW Lovejoy St., Ste 900, Portland, OR 97209 as  
7 its agent for service of process. Defendant Pixelworks, Inc. regularly conducts and transacts  
8 business in California, throughout the United States, and within the Northern District of  
9 California, itself and/or through one or more subsidiaries, affiliates, business divisions, or business  
10 units.  
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12         6. On information and belief, Defendant Zoran Corporation, is a corporation  
13 organized and existing under the laws of the State of Delaware with its principal place of business  
14 at 1390 Kifer Rd., Sunnyvale, CA 94086. This defendant has appointed The Prentice-Hall  
15 Corporation System, Inc., 2711 Centerville Road, Ste 400, Wilmington, New Castle, DE 19808 as  
16 its agent for service of process. Defendant Zoran Corporation regularly conducts and transacts  
17 business in California, throughout the United States, and within the Northern District of  
18 California, itself and/or through one or more subsidiaries, affiliates, business divisions, or business  
19 units.  
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21         7. On information and belief, Defendant Toshiba Corporation is a Japanese  
22 Corporation with its principal place of business at 1-1, Shibaura 1-chome, Minato-ku, Tokyo 105-  
23 8001, Japan. On information and belief, Defendant Toshiba Corporation, is a nonresident of  
24 California who engages in business in this state, but does not maintain a regular place of business  
25 in this state or a designated agent for service of process in this state. On information and belief,  
26 Defendant Toshiba Corporation resides in this jurisdiction within the meaning of 28 U.S.C. §  
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1 1400(b). This proceeding arises, in part, out of business done in this state. Defendant Toshiba  
2 Corporation may be served with process in Japan pursuant to the Hague Convention on the  
3 Service Abroad of Judicial and Extrajudicial Documents, Article 1, November 15, 1965 T.I.A.S.  
4 No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969). Defendant Toshiba Corporation regularly conducts  
5 and transacts business in California, throughout the United States, and within the Northern District  
6 of California, itself and/or through one or more subsidiaries, affiliates, business divisions, or  
7 business units.

8  
9 8. On information and belief, Defendant Toshiba America, Inc., is a corporation  
10 organized and existing under the laws of the State of Delaware with its principal place of business  
11 at 1251 Avenue of the Americas Suite 4110, New York, New York 10020. This defendant has  
12 appointed The Corporation Trust Company, Corporation Trust Center 1209 Orange Street,  
13 Wilmington, New Castle, DE 19801 as its agent for service of process. Defendant Toshiba  
14 America, Inc. regularly conducts and transacts business in California, throughout the United  
15 States, and within the Northern District of California, itself and/or through one or more  
16 subsidiaries, affiliates, business divisions, or business units. Toshiba Corporation, and Toshiba  
17 America, Inc will be referred to herein individually and collectively as "Toshiba Defendants."

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19 9. On information and belief, Defendant Panasonic Corporation is a corporation  
20 organized and existing under the laws of Japan with its principal place of business located at 1006  
21 Oaza Kadoma, Kadoma City, Osaka 571-8501, Japan. On information and belief, Defendant  
22 Panasonic Corporation is a nonresident of California who engages in business in this state, but  
23 does not maintain a regular place of business in this state or a designated agent for service of  
24 process in this state. On information and belief, Defendant Panasonic Corporation resides in this  
25 jurisdiction within the meaning of 28 U.S.C. § 1400(b). This proceeding arises, in part, out of  
26 business done in this state. Defendant Panasonic Corporation may be served with process in Japan  
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1 pursuant to the Hague Convention on the Service Abroad of Judicial and Extrajudicial Documents,  
2 Article 1, November 15, 1965 T.I.A.S. No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969). Defendant  
3 Panasonic Corporation regularly conducts and transacts business in California, throughout the  
4 United States, and within the Northern District of California, itself and/or through one or more  
5 subsidiaries, affiliates, business divisions, or business units.

6  
7 10. On information and belief, Defendant Panasonic Corporation of North America is a  
8 corporation organized and existing under the laws of the State of Delaware with its principal place  
9 of business at One Panasonic Way, Panazip 71-1, Secaucus, New Jersey 07094. This defendant  
10 has appointed the Corporation Trust Company, Corporation Trust Center, 1209 Orange Street,  
11 Wilmington, New Castle, DE, 19801, as its agent for service of process. Defendant Panasonic  
12 Corporation of North America regularly conducts and transacts business in California, throughout  
13 the United States, and within the Northern District of California, itself and/or through one or more  
14 subsidiaries, affiliates, business divisions, or business units. Panasonic Corporation and  
15 Panasonic Corporation of North America will be referred to herein individually and collectively as  
16 "Panasonic Defendants."

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18 11. On information and belief, Defendant Mitsubishi Electric Corporation is a  
19 corporation organized and existing under the laws of Japan with its principal place of business  
20 located at Tokyo Building, 2-7-3 Marunouchi Chiyoda-ku Tokyo 100-8310 Japan. On  
21 information and belief, Defendant Mitsubishi Electric Corporation is a nonresident of California  
22 who engages in business in this state, but does not maintain a regular place of business in this state  
23 or a designated agent for service of process in this state. On information and belief, Defendant  
24 Mitsubishi Electric Corporation resides in this jurisdiction within the meaning of 28 U.S.C. §  
25 1400(b). This proceeding arises, in part, out of business done in this state. Defendant Mitsubishi  
26 Electric Corporation may be served with process in Japan pursuant to the Hague Convention on  
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1 the Service Abroad of Judicial and Extrajudicial Documents, Article 1, November 15, 1965  
2 T.I.A.S. No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969). Defendant Mitsubishi Electric Corporation  
3 regularly conducts and transacts business in California, throughout the United States, and within  
4 the Northern District of California, itself and/or through one or more subsidiaries, affiliates,  
5 business divisions, or business units.

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7 12. On information and belief, Defendant Mitsubishi Electric Visual Solutions America  
8 Inc is a corporation organized and existing under the laws of the State of Delaware with its  
9 principal place of business at 9351 Jeronimo Rd., Irvine, CA 92618. This defendant has appointed  
10 the Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, New  
11 Castle, DE, 19801, as its agent for service of process. Defendant Mitsubishi Electric Visual  
12 Solutions America Inc regularly conducts and transacts business in California, throughout the  
13 United States, and within the Northern District of California, itself and/or through one or more  
14 subsidiaries, affiliates, business divisions, or business units.

15  
16 13. On information and belief, Defendant Mitsubishi Digital Electronics America, Inc.  
17 is a corporation organized and existing under the laws of the State of Delaware with its principal  
18 place of business at 9351 Jeronimo Rd., Irvine, CA 92618. This defendant has appointed the  
19 Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, New  
20 Castle, DE, 19801, as its agent for service of process. Defendant Mitsubishi Digital Electronics  
21 America, Inc. regularly conducts and transacts business in California, throughout the United  
22 States, and within the Northern District of California, itself and/or through one or more  
23 subsidiaries, affiliates, business divisions, or business units. Mitsubishi Electric Corporation,  
24 Mitsubishi Electric Visual Solutions America Inc., Mitsubishi Digital Electronics America, Inc.  
25 will be referred to herein individually and collectively as "Mitsubishi Defendants."  
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1           14. On information and belief, Defendant Vizio Inc. is a corporation organized and  
2 existing under the laws of the State of California with its principal place of business at 39 Tesla,  
3 Irvine, CA 92618. This defendant has appointed the CT Corporation System, 818 W. Seventh St.  
4 Los Angeles, CA 90017, as its agent for service of process. Defendant Vizio Inc. regularly  
5 conducts and transacts business in California, throughout the United States, and within the  
6 Northern District of California, itself and/or through one or more subsidiaries, affiliates, business  
7 divisions, or business units.

9           15. On information and belief, Defendant Sharp Corporation is a corporation organized  
10 and existing under the laws of Japan with its principal place of business located at 22-22 Nagaik-  
11 cho, Abeno-ku, Osaka 545-8522, Japan. On information and belief, Defendant Sharp Corporation  
12 is a nonresident of California who engages in business in this state, but does not maintain a regular  
13 place of business in this state or a designated agent for service of process in this state. On  
14 information and belief, Defendant Sharp Corporation resides in this jurisdiction within the  
15 meaning of 28 U.S.C. § 1400(b). This proceeding arises, in part, out of business done in this state.  
16 Defendant Sharp Corporation may be served with process in Japan pursuant to the Hague  
17 Convention on the Service Abroad of Judicial and Extrajudicial Documents, Article 1, November  
18 15, 1965 T.I.A.S. No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969). Defendant Sharp Corporation  
19 regularly conducts and transacts business in California, throughout the United States, and within  
20 the Northern District of California, itself and/or through one or more subsidiaries, affiliates,  
21 business divisions, or business units.

24           16. Defendant Sharp Electronics Manufacturing Company of America, Inc. is a  
25 subsidiary of Sharp Corporation, and is organized and existing under the laws of the State of  
26 California with its principal place of business at 9295 Siempre Viva Road, San Diego, California  
27 92154. This defendant has appointed the CT Corporation System, 818 W. Seventh St. Los

1 Angeles, CA 90017, as its agent for service of process. Defendant Sharp Electronics  
2 Manufacturing Company of America, Inc. regularly conducts and transacts business in California,  
3 throughout the United States, and within the Northern District of California, itself and/or through  
4 one or more subsidiaries, affiliates, business divisions, or business units.

5  
6 17. Defendant Sharp Electronics Corporation is a subsidiary of Sharp Corporation, and  
7 is organized and existing under the laws of the State of New York with its principal place of  
8 business at Sharp Plaza, Mahwah, NJ 07495. This defendant has appointed the CT Corporation  
9 System, 818 W. Seventh St. Los Angeles, CA 90017, as its agent for service of process. Defendant  
10 Sharp Electronics Corporation regularly conducts and transacts business in California, throughout  
11 the United States, and within the Northern District of California, itself and/or through one or more  
12 subsidiaries, affiliates, business divisions, or business units. Sharp Corporation, Sharp Electronics  
13 Manufacturing Company of America, Inc. and Sharp Electronics Corporation will be referred to  
14 herein individually and collectively as "Sharp Defendants."

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16 18. On information and belief, Defendant Funai Electric Co., Ltd. is a corporation  
17 organized and existing under the laws of Japan with its principal place of business located at 7-7-1  
18 Nakagaito, Daito, Osaka 574-0013, Japan. On information and belief, Funai Electric Co., Ltd is a  
19 nonresident of California who engages in business in this state, but does not maintain a regular  
20 place of business in this state or a designated agent for service of process in this state. On  
21 information and belief, Funai Electric Co., Ltd resides in this jurisdiction within the meaning of  
22 28 U.S.C. § 1400(b). This proceeding arises, in part, out of business done in this state. Funai  
23 Electric Co., Ltd may be served with process in Japan pursuant to the Hague Convention on the  
24 Service Abroad of Judicial and Extrajudicial Documents, Article 1, November 15, 1965 T.I.A.S.  
25 No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969). Funai Electric Co., Ltd regularly conducts and  
26 transacts business in California, throughout the United States, and within the Northern District of  
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1 California, itself and/or through one or more subsidiaries, affiliates, business divisions, or business  
2 units.

3 19. On information and belief, Defendant Funai Corporation, Inc. is a subsidiary of  
4 Funai Electric Co., Ltd and is organized and existing under the laws of the State of California with  
5 its principal place of business at 201 Route 17 North, Suite 903 Rutherford, NJ, 07070. This  
6 defendant is registered to do business in California and has appointed National Corporate  
7 Research, Ltd, 523 W. 6<sup>th</sup> Street, Ste. 544, Los Angeles, CA 90014 as its agent for service of  
8 process. Defendant Funai Corporation, Inc. regularly conducts and transacts business in  
9 California, throughout the United States, and within the Northern District of California, itself  
10 and/or through one or more subsidiaries, affiliates, business divisions, or business units. Funai  
11 Electric Co., Ltd and Funai Corporation, Inc. will be referred to herein individually and  
12 collectively as "Funai Defendants."  
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### 15 JURISDICTION AND VENUE

16 20. This is an action under the Patent Laws of the United States, Title 35 of the United  
17 States Codes, namely, 35 U.S.C. §§ 1 et seq. including 35 U.S.C. §§ 271 and 281, *et seq*, because  
18 each of the Defendants has committed acts of patent infringement within the United States and this  
19 judicial district. Accordingly, this Court has subject matter jurisdiction of this action pursuant to 28  
20 U.S.C. §§ 1331 and 1338(a).

21 21. Venue is proper in this District under 28 U.S.C. §§ 1391 and/or 1400 (b) because  
22 Defendants are subject to personal jurisdiction in this District and/or have committed acts within  
23 this District giving rise to this action. At a bare minimum, each of the Defendants has delivered  
24 infringing products into the stream of commerce with the expectation that they will be purchased  
25 and used by consumers in California, including consumers in the Northern District of California.

26 22. Plaintiff Innovus Prime LLC has a principal place of business in this District.  
27

1                                    **PLAINTIFF'S PATENT**

2            23.     On January 18, 1994, the United States Patent and Trademark Office duly and  
3            legally issued U.S. Patent No. 5,280,350 ("the '350 Patent"), entitled "Method and Apparatus for  
4            Processing a Picture Signal to Increase the Number of Displayed Television Lines Using Motion  
5            Vector Compensated Values." A copy of the '350 Patent is attached to the Amended Complaint as  
6            Appendix A.

7  
8            24.     By reason of an assignment, Plaintiff Innovus Prime LLC owns all rights, title and  
9            interest in the '350 Patent. The '350 Patent concerns *inter alia* embodiments for a method for  
10           processing a picture signal to obtain a picture signal having improved properties.

11  
12                                    **COUNT I**  
13                                    **INFRINGEMENT OF U.S. PATENT NO. 5,280,350**

14  
15            25.     Plaintiff Innovus Prime LLC repeats and incorporates by reference each of the  
16            allegations contained in Paragraphs 1 and 24 above, and further alleges as follows:

17            26.     On information and belief, without a license or permission from Plaintiff Innovus  
18            Prime LLC, LG Defendants have infringed one or more claims of the '350 Patent in the State of  
19            California, in this judicial district, and elsewhere in the United States by importing, making, using,  
20            selling or offering for sale products that embody and/or practice the invention for processing a  
21            picture signal to obtain a picture signal having improved properties. LG Defendants have induced  
22            infringement of and/or contributed to the infringement of one of more claims of the '350 Patent.  
23            LG Defendants are thus liable for infringement of the '350 Patent pursuant to 35 U.S.C. § 271  
24            literally and/or under the doctrine of equivalents. Without limitation, several examples of LG  
25            Defendants' infringing products include the products listed on Appendix B which is attached  
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1 hereto, LG Defendants' infringement of the '350 Patent has caused substantial damage to Plaintiff  
2 Innovus Prime LLC.

3       27. On information and belief, without a license or permission from Plaintiff Innovus  
4 Prime LLC, Defendant Pixelworks Inc. has infringed one or more claims of the '350 Patent in the  
5 State of California, in this judicial district, and elsewhere in the United States by importing,  
6 making, using, selling or offering for sale products that embody and/or practice the invention for  
7 processing a picture signal to obtain a picture signal having improved properties. Defendant  
8 Pixelworks Inc. has induced infringement of and/or contributed to the infringement of one of more  
9 claims of the '350 Patent. Defendant Pixelworks Inc. is thus liable for infringement of the '350  
10 Patent pursuant to 35 U.S.C. § 271 literally and/or under the doctrine of equivalents. Without  
11 limitation, several examples of Defendant Pixelworks Inc.'s infringing products include the  
12 PW9800 family of products including the PW9800-10G and PW9800-30G. Defendant Pixelworks  
13 Inc.'s infringement of the '350 Patent has caused substantial damage to Plaintiff Innovus Prime  
14 LLC.  
15

16       28. On information and belief, without a license or permission from Plaintiff Innovus  
17 Prime LLC, Defendant Zoran Corporation has infringed one or more claims of the '350 Patent in  
18 the State of California, in this judicial district, and elsewhere in the United States by importing,  
19 making, using, selling or offering for sale products that embody and/or practice the invention for  
20 processing a picture signal to obtain a picture signal having improved properties. Defendant Zoran  
21 Corporation has induced infringement of and/or contributed to the infringement of one of more  
22 claims of the '350 Patent. Defendant Zoran Corporation is thus liable for infringement of the '350  
23 Patent pursuant to 35 U.S.C. § 271 literally and/or under the doctrine of equivalents. Without  
24 limitation, several examples of Defendant Zoran Corporation's infringing products include the  
25 SupraFRC® family of products including the SupraFRC® 201 Frame Rate Conversion (FRC)  
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1 processor and SupraFRC® 301 processor. Defendant Zoran Corporation's infringement of the  
2 '350 has caused substantial damage to Plaintiff Innovus Prime LLC.

3         29. On information and belief, without a license or permission from Plaintiff Innovus  
4 Prime LLC, Toshiba Defendants have infringed one or more claims of the '350 Patent in the State  
5 of California, in this judicial district, and elsewhere in the United States by importing, making,  
6 using, selling or offering for sale products that embody and/or practice the invention for  
7 processing a picture signal to obtain a picture signal having improved properties. Toshiba  
8 Defendants have induced infringement of and/or contributed to the infringement of one of more  
9 claims of the '350 Patent. Toshiba Defendants are thus liable for infringement of the '350 Patent  
10 pursuant to 35 U.S.C. § 271 literally and/or under the doctrine of equivalents. Without limitation,  
11 several examples of Toshiba Defendants' infringing products include the products listed on  
12 Appendix C which is attached hereto. Toshiba Defendants' infringement of the '350 Patent has  
13 caused substantial damage to Plaintiff Innovus Prime LLC.

14         30. On information and belief, without a license or permission from Plaintiff Innovus  
15 Prime LLC, Panasonic Defendants have infringed one or more claims of the '350 Patent in the  
16 State of California, in this judicial district, and elsewhere in the United States by importing,  
17 making, using, selling or offering for sale products that embody and/or practice the invention for  
18 processing a picture signal to obtain a picture signal having improved properties. Panasonic  
19 Defendants have induced infringement of and/or contributed to the infringement of one of more  
20 claims of the '350 Patent. Panasonic Defendants are thus liable for infringement of the '350 Patent  
21 pursuant to 35 U.S.C. § 271 literally and/or under the doctrine of equivalents. Without limitation,  
22 several examples of Panasonic Defendants' infringing products include the VIERA® family of  
23 television products, including models TC-L32DT30 (DT30 Series), TC-L37DT30 (DT30 Series),  
24 TC-L42D30 (D30 Series), TC-L42E30 (E Series), and TC-L42U30 (U30 Series), and projectors  
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1 including models PT-AE3000U, PT-AE4000U, and PT-AE7000. Panasonic Defendants'  
2 infringement of the '350 Patent has caused substantial damage to Plaintiff Innovus Prime LLC.

3 31. On information and belief, without a license or permission from Plaintiff Innovus  
4 Prime LLC, Mitsubishi Defendants have infringed one or more claims of the '350 Patent in the  
5 State of California, in this judicial district, and elsewhere in the United States by importing,  
6 making, using, selling or offering for sale products that embody and/or practice the invention for  
7 processing a picture signal to obtain a picture signal having improved properties. Mitsubishi  
8 Defendants have induced infringement of and/or contributed to the infringement of one of more  
9 claims of the '350 Patent. Mitsubishi Defendants are thus liable for infringement of the '350  
10 Patent pursuant to 35 U.S.C. § 271 literally and/or under the doctrine of equivalents. Without  
11 limitation, several examples of Mitsubishi Defendants' infringing products include the products  
12 listed on Appendix D which is attached hereto. The infringing products further include projectors  
13 including model HC9000D. Mitsubishi Defendants' infringement of the '350 Patent has caused  
14 substantial damage to Plaintiff Innovus Prime LLC.  
15

16 32. On information and belief, without a license or permission from Plaintiff Innovus  
17 Prime LLC, Defendant Vizio Inc. has infringed one or more claims of the '350 Patent in the State  
18 of California, in this judicial district, and elsewhere in the United States by importing, making,  
19 using, selling or offering for sale products that embody and/or practice the invention for  
20 processing a picture signal to obtain a picture signal having improved properties. Defendant Vizio  
21 Inc has induced infringement of and/or contributed to the infringement of one of more claims of  
22 the '350 Patent. Defendant Vizio Inc. is thus liable for infringement of the '350 Patent pursuant to  
23 35 U.S.C. § 271 literally and/or under the doctrine of equivalents. Without limitation, several  
24 examples of Defendant Vizio Inc.'s infringing products include the products listed on Appendix E  
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1 which is attached hereto. Defendant Vizio Inc.'s infringement of the '350 has caused substantial  
2 damage to Plaintiff Innovus Prime LLC.

3         33. On information and belief, without a license or permission from Plaintiff Innovus  
4 Prime LLC, Sharp Defendants have infringed one or more claims of the '350 Patent in the State of  
5 California, in this judicial district, and elsewhere in the United States by importing, making, using,  
6 selling or offering for sale products that embody and/or practice the invention for processing a  
7 picture signal to obtain a picture signal having improved properties. Sharp Defendants have  
8 induced infringement of and/or contributed to the infringement of one of more claims of the '350  
9 Patent. On information and belief, Sharp Defendants are thus liable for infringement of the '350  
10 Patent pursuant to 35 U.S.C. § 271, more particularly pursuant to 35 U.S.C. § 271 (a), (b), (c)  
11 and/or (f),, literally and/or under the doctrine of equivalents. Without limitation, several examples  
12 of Sharp Defendants' infringing products include the products listed on Appendix F which is  
13 attached hereto. Sharp Defendants' infringement of the '350 Patent has caused substantial damage  
14 to Plaintiff Innovus Prime LLC.

15         34. On information and belief, without a license or permission from Plaintiff Innovus  
16 Prime LLC, Funai Defendants have infringed one or more claims of the '350 Patent in the State of  
17 California, in this judicial district, and elsewhere in the United States by importing, making, using,  
18 selling or offering for sale products that embody and/or practice the invention for processing a  
19 picture signal to obtain a picture signal having improved properties. Funai Defendants have  
20 induced infringement of and/or contributed to the infringement of one of more claims of the '350  
21 Patent. Funai Defendants are thus liable for infringement of the '350 Patent pursuant to 35 U.S.C.  
22 § 271. Without limitation, several examples of Funai Defendants' infringing products include  
23 LC401SS2 (sold under the Sylvania brand name) and LC401EM2 (sold under the Emerson brand  
24  
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27



1 name). Funai Defendants' infringement of the '350 Patent has caused substantial damage to  
2 Plaintiff Innovus Prime LLC.

3 35. To the extent that facts learned in discovery show that Defendants' infringement of  
4 the '350 Patent has been willful, Plaintiff Innovus Prime LLC reserves the right to request such a  
5 finding at time of trial.

6  
7 36. As a result of these Defendants' infringement of the '350 Patent, Plaintiff Innovus  
8 Prime LLC has suffered monetary damages in an amount not yet determined.

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11 **DEMAND FOR JURY TRIAL**

12 Pursuant to Fed.R.Civ.P. 38, Plaintiff Innovus Prime LLC requests a trial by jury on all  
13 issues allowable by law.

14  
15 **CERTIFICATION OF INTERESTED PARTIES OR PERSONS**

16 Pursuant to Civil L.R. 3-16, the undersigned certifies that the following listed person,  
17 association of persons, firms, partnerships, corporations (including parent corporations) or other  
18 entities (i) have a financial interest in the subject matter in controversy or in a party to the  
19 proceeding, or (ii) have a non-financial interest in that subject matter or in a party that could be  
20 substantially affected by the outcome of the proceeding:

21  
22 Innovus Prime LLC

23  
24 **PRAYER FOR RELIEF**

25 WHEREFORE, Plaintiff Innovus Prime LLC prays for the following relief:  
26  
27

1 A. For decree and judgment against Defendants and all in privity with Defendants that the  
2 '350 Patent is valid and enforceable;

3 B. For decree and judgment against Defendants and all in privity with Defendants that the  
4 '350 Patent has been infringed by Defendants and that Defendants are liable as patent infringers;

5 C. For decree and judgment against Defendants and all in privity with Defendants that  
6 Defendants have infringed, induced infringement of, and/or contributed to the infringement of the  
7 '350 Patent.  
8

9 D. For decree and judgment against Defendants and all in privity with Defendants requiring  
10 Defendants to pay Plaintiff Innovus Prime LLC its damages, costs, expenses, and prejudgment and  
11 post-judgment interest for Defendants' infringement of the '350 Patent under 35 U.S.C. § 284 and  
12 28 U.S.C. § 1961;

13 E. An award to Plaintiff Innovus Prime LLC for enhanced damages resulting from the  
14 knowing, deliberate, and willful nature of Defendants' prohibited conduct with notice being made  
15 at least as early of the date of the filing of this Complaint, as provided under 35 U.S.C. § 284;

16 F. A decree and judgment finding that this is an exceptional case within the meaning of 35  
17 U.S.C. § 285 and awarding to Plaintiff Innovus Prime LLC its reasonable attorneys' fees  
18

19 G. For such other and further relief which should appear just and equitable to this Court.  
20

21  
22 Dated: October 29, 2011.

Respectfully submitted,

23 By:   
24

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Metairie, LA 70001-3032  
Telephone: (415) 577-0698  
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25  
26  
27 *Attorneys for Plaintiff,  
Innovus Prime LLC*



US005280350A

# United States Patent [19]

## DeHaan et al.

[11] Patent Number: 5,280,350  
 [45] Date of Patent: Jan. 18, 1994

[54] METHOD AND APPARATUS FOR PROCESSING A PICTURE SIGNAL TO INCREASE THE NUMBER OF DISPLAYED TELEVISION LINES USING MOTION VECTOR COMPENSATED VALUES

4,924,305 5/1990 Nakagawa et al. .... 358/140 X  
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G. de Haan et al., "New Algorithm For Motion Estimation", Proceedings of the Third International Workshop on HDTV, Torino, 1989.

Primary Examiner—Victor R. Kostak  
 Attorney, Agent, or Firm—Michael E. Marion

[75] Inventors: Gerard DeHaan; Gerrit F. M. DePoortere, both of Eindhoven, Netherlands

[73] Assignee: U.S. Philips Corporation, New York, N.Y.

[21] Appl. No.: 751,290

[22] Filed: Aug. 29, 1991

[30] Foreign Application Priority Data

Sep. 3, 1990 [EP] European Pat. Off. .... 90202330.8

[51] Int. Cl.<sup>5</sup> ..... H04N 7/01

[52] U.S. Cl. .... 358/140; 358/105; 358/167

[58] Field of Search ..... 358/105, 140, 136, 166, 358/167, 11; H04N 7/01

### References Cited

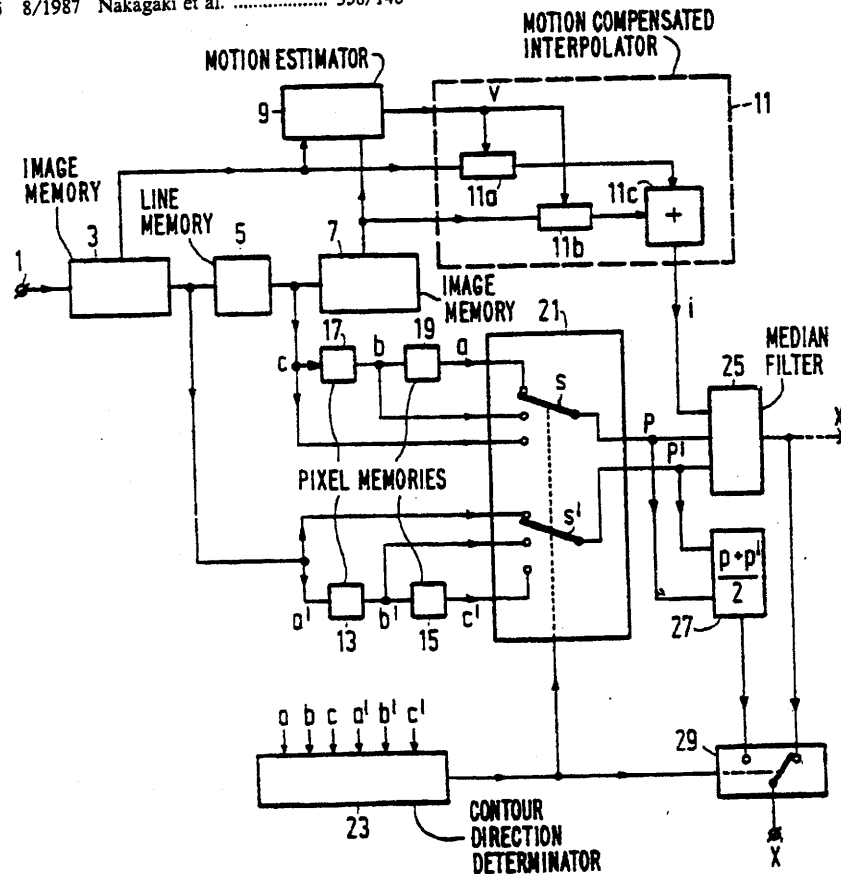
### U.S. PATENT DOCUMENTS

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6 Claims, 2 Drawing Sheets

### [57] ABSTRACT

After a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field (II) from picture information of at least one neighboring field (I, III), the additional line is vertically filtered to remove artifacts caused by motion estimation errors.



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Sheet 1 of 2

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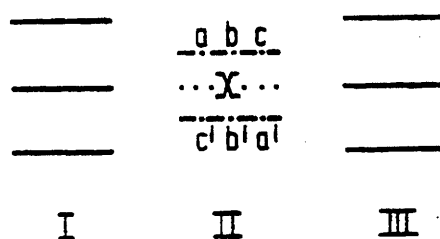
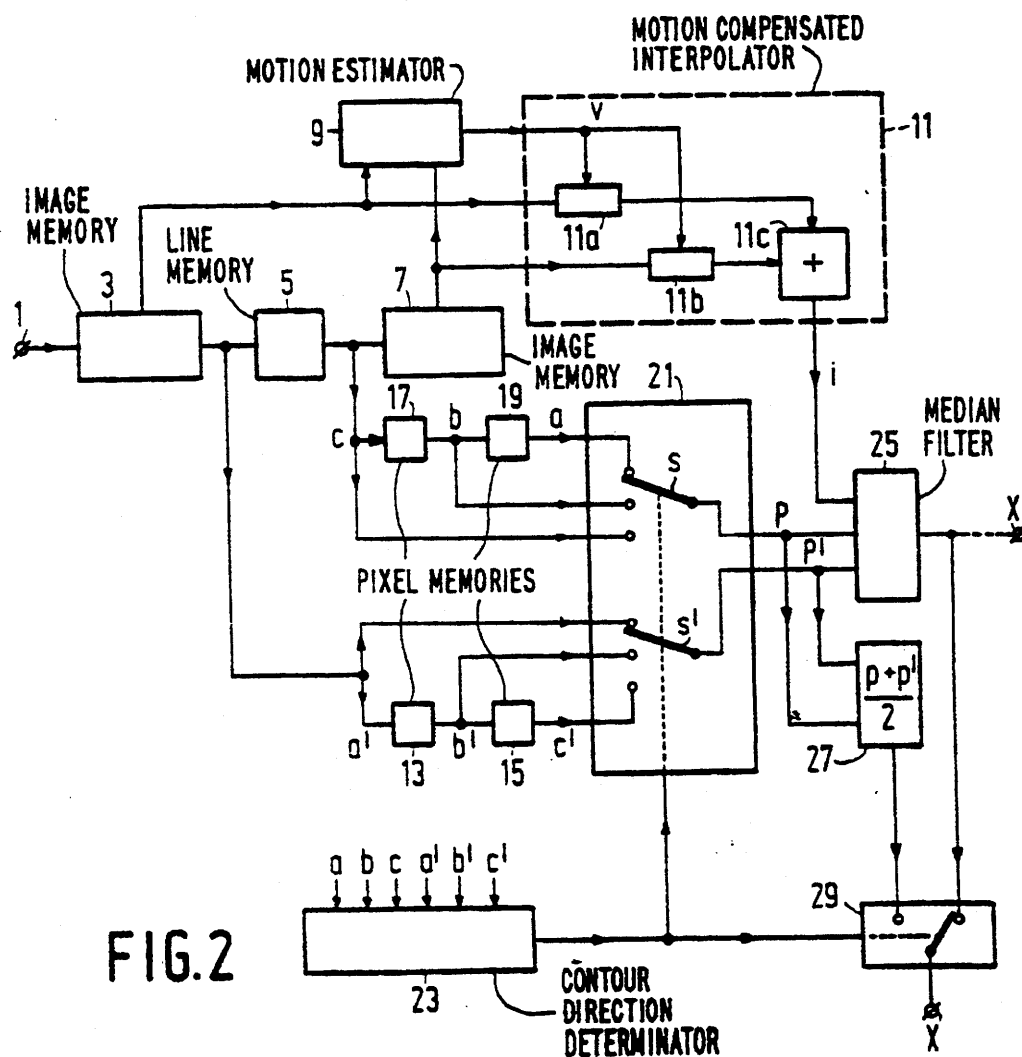


FIG. 1



U.S. Patent

Jan. 18, 1994

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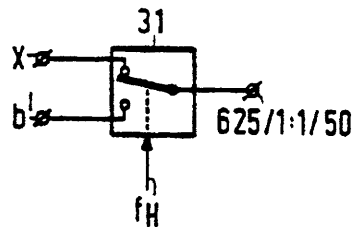


FIG. 3A

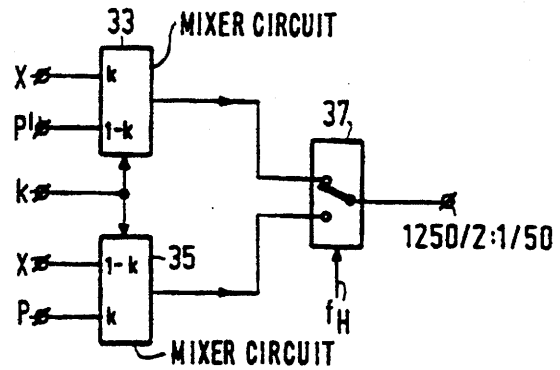


FIG. 3B

625/2:1/50

625/1:1/50

1250/2:1/50

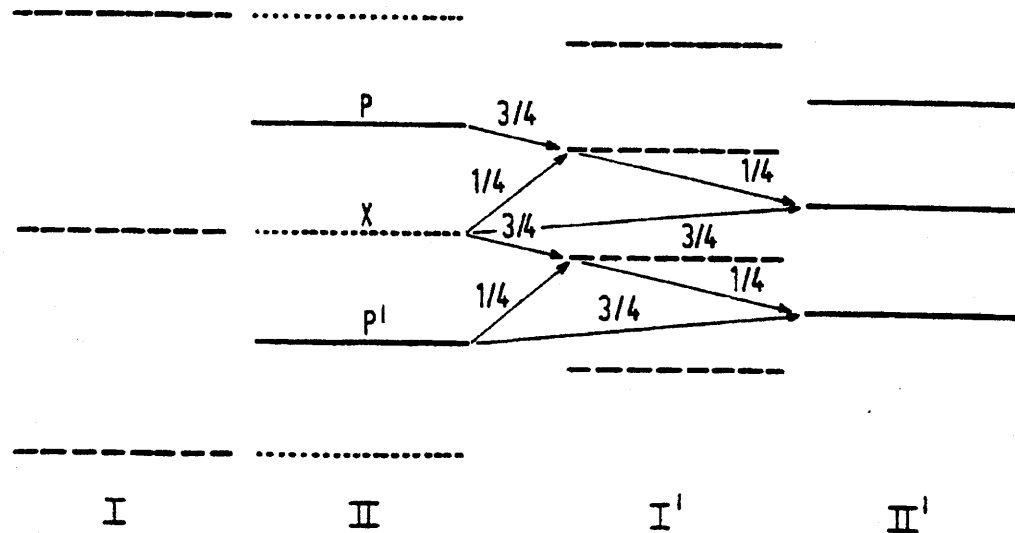


FIG. 4

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# METHOD AND APPARATUS FOR PROCESSING A PICTURE SIGNAL TO INCREASE THE NUMBER OF DISPLAYED TELEVISION LINES USING MOTION VECTOR COMPENSATED VALUES

## BACKGROUND OF THE INVENTION

The invention relates to a method and an apparatus for processing a picture signal to obtain a picture signal having improved properties, such as being noninterlaced or having a doubled line number, while still being interlaced.

EP-A 0 361 558 describes a method and an apparatus of this kind. Therein, a median is determined of signals from two adjacent lines in a given field of the picture signal and from one line of a field preceding the given field and lying vertically between the two adjacent lines in the given field. Preferably, a direction of a contour is determined also, to control the apparatus such that it supplies the median if the contour direction is substantially vertical, and that it supplies an average of the signals from the two adjacent lines otherwise. The supplied signal is multiplexed with the signals of the given field to obtain the non-interlaced picture signal or is processed with the signals of the given field to obtain a field of an interlaced picture signal having the doubled line number.

## SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method and an apparatus which offer a better picture display quality than the prior art.

For this purpose, a first aspect of the invention provides a method of processing a line- and field-sequentially assembled picture signal, comprising the steps of:

- performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least one neighboring field; and
- vertically filtering said additional line using at least one of said adjacent lines of said given field.

A second aspect of the invention provides an apparatus for processing a line- and field-sequentially assembled picture signal, comprising:

- means for performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least one neighboring field; and
- means for vertically filtering said additional line using at least one of said adjacent lines of said given field.

These aspects of the invention are based on the recognition that the quality of the viewed image can be considerably improved by the use of motion compensated values rather than direct values from the interjacent line of the preceding field.

If a motion vector compensated interpolation is considered good enough, the vertical filtering operation can be dispensed with and the non-interlaced or doubled line number output signal can be obtained by a third aspect of the invention which provides an apparatus for processing a line- and field-sequentially picture signal, comprising:

- means for performing a motion vector compensated interpolation to obtain additional lines between each time two adjacent lines of a given field from picture information of at least one neighboring field; and

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means for combining said additional lines and said adjacent lines to form a field having twice a number of lines of said given field.

These and other (more detailed) aspects of the invention will be described and elucidated with reference to the drawings and examples.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 schematically shows a number of lines from three successive fields of the picture signal;

FIG. 2 shows an apparatus according to the invention;

FIG. 3A and 3B show two postprocessors to be added to the apparatus of FIG. 2; and

FIG. 4 shows a representation of line number doubling and progressive scan conversion operations.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

FIG. 1 schematically shows a number of lines from three successive fields I, II and III. Between two existing lines (indicated by bars and dots) in field II, a new line (indicated by dots only) is to be interpolated. The present invention provides a new method and apparatus for obtaining the pixel value X on that new line. The method of the invention basically consists of two steps:

1. obtain by motion compensated interpolation an interpolated value from at least the neighboring field I.
2. perform a spatial filtering on the interpolated value to remove artifacts caused by motion estimation errors.

The present invention does not require any specific motion compensated interpolation method; in principle, any method will do. The preferred motion estimator to be used in the motion compensated interpolation has been described in the article "New Algorithm for Motion Estimation", presented by G. de Haan and H. Huijgen at the Third International Workshop on HDTV, Torino 1989. As motion artifacts will be removed by step 2, it is not necessary to use a costly high quality motion compensated interpolation method to obtain high quality results. However, if the motion vector compensated interpolation would yield satisfactory results, the spatial filtering might be dispensed with completely. If artifacts introduced by the spatial filtering are worse than motion vector compensation artifacts, it might even be preferred to omit the spatial filtering. Having regard to the present state of the art in motion vector compensation, it is preferred to perform the spatial postfiltering after the motion vector compensated interpolation.

If the present invention is considered starting from the spatial filtering, the output quality of the spatial filtering is considerably improved by the prior motion compensated interpolation which already provides a reasonable first guess.

If we focus on the spatial postfiltering, a simple implementation would take the median of the pixel value b on the line above the line to be interpolated, the motion compensated interpolated value and the pixel value b' on the line below the line to be interpolated. As set out in U.S. Pat. No. 4,740,842, incorporated herein by reference, it is alternatively possible to determine a contour direction first, by evaluating the pixel value pairs (a, a'), (b, b') and (c, c'). The pair which gives the smallest difference between the two pixel values is called the pair (p, p'); this pair (p, p') is then used in the median



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filtering instead of the pair (b, b'). However, in a preferred embodiment which follows a teaching of EP-A 0 361 558, incorporated herein by reference, it is first determined whether the pair (p, p') which gives the smallest difference between the two pixel values, corresponds to the vertical direction, i.e. whether (p, p') = (b, b'). If this is true, then the median of the pixel values b, b' and the motion compensated interpolated value is determined, in the other case, the average of the pixel values p and p' is outputted as the interpolation result. In an elaboration of this embodiment, the median is also chosen when there is no clear preference for an oblique direction like e.g. the (a, a') or (c, c') direction, which inter alia may occur when the image shows little contrast or is noisy, or when the contour direction is substantially horizontal. Consequently, the preferred filtering direction might be different from a determined edge direction.

FIG. 2 shows an apparatus which performs this last mentioned, preferred implementation of the invention. An input I is connected to a series arrangement of a first image memory 3, a line memory 5 and a second image memory 7. Information from both image memories 3 and 7 is used in a motion estimator 9 to determine a motion vector v. The motion estimator 9 may be of any known kind. Preferably, estimator 9 is the estimator described in the article "New Algorithm for Motion Estimation" mentioned above. Another possibility would e.g. be a block motion estimator which compares fields II and I to determine which pixels in field I correspond to a given block in field II. It will be appreciated that if the motion is estimated for blocks, motion vectors are obtained which are not only valid for the bar-dot existing lines in field II, but also for the dotted interjacent lines to be interpolated. The motion vector v and picture information from the image memories 3 and/or 7 are used in a motion compensated interpolator 11 to obtain an interpolated value i.

The motion compensated interpolator II comprises a vector controlled delay 11a which receives the picture information from the first image memory 3, a vector controlled delay 11b which receives picture information from the second image memory 7, and an adder 11c receiving output signals of both vector controlled delays 11a and 11b and supplying the interpolated value i. The vector controlled delays 11a and 11b supply their output signals in dependence on the motion vector v.

It will be appreciated that it is more economic to shift information from one field only rather than to perform a motion compensated averaging operation on information from two fields. However, previously, motion compensated averaging was preferred because the averaging action contributed to a removal of motion artifacts. As according to the present invention the motion compensated interpolation is followed by a vertical filtering to remove motion artifacts, it is no longer necessary to use information from two fields in the motion compensated interpolation, so that the more economic motion compensated shift of information from one field only becomes possible without a loss of image display quality.

If a motion compensated shift from only one field is performed, the vector controlled delay 11a and the adder 11c can be dispensed with; in that case the motion compensated interpolator 11 consists of the vector controlled delay 11b.

An output of the first image memory 3 supplies the pixel value a' and is connected to a series arrangement

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of two pixel memories 13 and 15 whose outputs supply the pixel values b' and c', respectively. An output of the line memory 5 supplies the pixel value c and is connected to a series arrangement of two pixel memories 17 and 19 whose outputs supply the pixel values b and a, respectively. The pixel values a, b, c and a', b', c' are applied to two switches S and S' of a switching device 21 which is controlled by a contour direction determinator 23 which may be as described in U.S. Pat. No. 4,740,842 or EP-A 0 361 558. Switch S supplies pixel value p while switch S' supplies the pixel value p'.

The motion compensated interpolated value i and the pixel values p and p' are applied to a median filter 25 which may be as described in U.S. Pat. No. 4,740,842. As shown by an interrupted line, in a simple embodiment of the invention the median filter 25 supplies the output value X. However, as discussed hereinbefore, in a preferred embodiment, the median of the pixel values i, p and p' is only supplied as the output value if the preferred filtering direction determined by the contour direction determinator 23 is the vertical direction. This implies that in this preferred embodiment instead of the pixel values p and p', the pixel values b and b' can be applied to the median filter 25, while there is no need for the pixel values b and b' to be applied to the switching device 21, so that the switches S and S' can become two-state switches instead of three-state switches.

As-described in a copending Application (PHN 13.436), the contour direction may instead of the pixels a', b', c' of a line lying in the same field and adjacent to the line on which the pixels a, b, c are positioned, use pixels from an interjacent line of the preceding field or from the interjacent line shown in FIG. 1 which is calculated by the motion compensated interpolator 11. As this interjacent line is closer to the line on which the pixels a, b, c are positioned, a more accurate contour direction determination is obtained. It will be evident from copending Application (PHN 13.436) that the contour direction determiner may determine more than 3 preferred filtering directions; in that case, switching device 21 and the number of pixel memories should be adapted accordingly.

To determine the average of p and p' which is to be supplied if the preferred filtering direction is oblique, the pixel values p and p' are supplied to an averager 27. The output of the median filter 25 and an output of the averager 27 are supplied to respective inputs of a switch 29. The switch 29 is controlled by the contour direction determiner 23 to supply the median filter output signal if the preferred filtering direction is vertical, and to supply the averager output signal if the preferred filtering direction is oblique, i.e. e.g. along a-a' or c-c'.

The man skilled in the art will appreciate that, as described in EP-A 0 361 558, the switch 29 may be a mixer performing a soft switch.

The apparatus shown in FIG. 2 can be used in a picture signal processing circuit constituting an interlaced-to-progressive scanning conversion circuit when, as shown in FIG. 3A, the output of the switch 29 is connected to a first input of a line compression-and-multiplex circuit 31, a second input of which is connected to receive the pixel value b'. The line compression-and-multiplex circuit 31 compresses the line periods of the picture signals applied to the inputs thereof with a factor 2 and then supplies, line-alternatingly, a picture signal supplied by the switch 29 and thereafter compressed, or a compressed input picture signal. A progressively scanned picture signal is then available at an

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output of the line compression-and-multiplex circuit 31, which result is denoted by 625/1:1/50, wherein 625 indicates the number of lines per picture, 1:1 stands for non-interlaced or progressive scan, and 50 indicates the number of fields. Such a line compression-and-multiplex circuit 31 is known per se and may, for example, be in the form of the cascade arrangement of the elements 223 and 244 in FIG. 3 of U.S. Pat. No. 4,740,842.

in FIG. 3A of the present Application only the multiplex action of the line compression-and-multiplex circuit 31 is symbolized.

The interpolation filter may alternatively be used in a picture signal processing circuit forming a line number doubling circuit which preserves interlace. To that end; as shown in FIG. 3B, the output of the switch 29 is connected to a first input of a first position-interpolation circuit designed as a mixer circuit 33, to a second input of which the signal from the picture element  $p'$  is applied, and to a first input of a second position-interpolation circuit designed as a mixer circuit 35, to a second input of which the signal from the picture element  $p$  is applied. Since the signals of the picture elements  $p'$  and  $p$  are applied to the second inputs of the respective mixer circuits 33 and 35, also the mixing operations performed by these mixer circuits 33 and 35 are contour dependent. Control inputs of the mixer circuits 33 and 35, receive a weighting factor  $k$  the value of which, for an appropriate relative positioning of the lines of the output signal, is equal to  $\frac{1}{2}$  during the first field of each picture and equal to  $\frac{3}{4}$  during the second field of each picture. Outputs of the mixer circuits 33 and 35 are connected to respective inputs of a line compression-and-multiplex circuit 37, from an output of which the interlaced output signal can be taken with double the number of lines. This output signal is indicated by 1250/2:1/50. For simplicity reasons, again only the multiplex action of block 37 is symbolized in FIG. 3B.

In FIG. 4 the operation of the interlaced-to-progressive scanning conversion circuit of FIG. 3A and of the line number doubling circuit of FIG. 3B which preserves interlace is illustrated in greater detail. In a left-hand column I broken lines indicate lines of a first interlaced input field and in a left-hand centre column H solid lines indicate lines of a second input field, the lines of the first and second input fields together forming an interlaced 625/2:1/50 input picture signal. In the left-hand centre column III the lines of the output signal X at the output of the switch 29 are represented by dotted lines. If the lines of the second field and the lines of the output signal X are combined by the line compression-and-multiplex circuit 31 as is shown in the left-hand centre column, a picture signal is obtained with a non-interlaced or progressive scanning, denoted 1:1, so that the 625/1:1/50 picture signal is formed.

In a right-hand centre column I' bold broken lines indicate lines of a first output field of the line number doubling circuit of FIG. 3B. The lines of the first and second output fields in the columns I' and II' form together the interlaced 1250/2:1/50 picture signal with double the number of lines. As is indicated by means of arrows, the interlace denoted by 2:1, is obtained in that the weighting factor  $k$  of FIG. 1 applied to the control inputs of the respective mixer circuits 33 and 35 changes its value from field to field ( $k = \frac{1}{2}$  or  $k = \frac{3}{4}$ ).

After having read this description, a person skilled in the art will be able to design numerous variations. All these variations are considered to be part of the field of the invention. For example, the output signal of the

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switch 29 can be used for forming an image signal having twice the field number of the input signal.

We claim:

1. A method of processing a line and field sequentially assembled picture signal, comprising the steps of:
  - performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least one neighboring field;
  - vertically filtering said additional line using at least one of said adjacent lines of said given field, wherein said vertically filtering step includes determining a median of signals from said additional line and from two lines adjacent to said additional line;
  - determining a direction of a contour in a picture of said picture signal to obtain a preferred filtering direction;
  - obtaining an average of two pixel values on said two adjacent lines in the direction of the contour; and
  - supplying said median if said preferred filtering direction is vertical, and supplying said average otherwise.
2. A method of processing a line and field sequentially assembled picture signal, comprising the steps of:
  - performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least one neighboring field;
  - vertically filtering said additional line using at least one of said adjacent lines of said given field, wherein said additional line and said adjacent lines of said given field are multiplexed to form a non-interlaced picture signal.
3. A method of processing a line and field sequentially assembled picture signal, comprising the steps of:
  - performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least one neighboring field;
  - vertically filtering said additional lines using at least one of said adjacent lines of said given field, wherein said additional line and said adjacent lines of said given field are processed to form a field of an interlaced picture signal having a doubled line number.
4. Apparatus for processing a line and field sequentially assembled picture signal, comprising:
  - means for performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least one neighboring field; and
  - means for vertically filtering said additional line using at least one of said adjacent lines of said given field; wherein said vertically filtering means further include:
    - means for determining a median of signals from said additional line and from two lines adjacent to said additional line;
    - means for determining a direction of a contour in a picture of said picture signal to obtain a preferred filtering direction;
    - means for obtaining an average of two pixel values on said two adjacent lines in the direction of said contour; and
    - means for supplying said median if said preferred filtering direction is vertical, and supplying said average otherwise.



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5. Apparatus for processing a line and field sequentially assembled picture signal, comprising:  
means for performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least on neighboring field; and  
means for vertically filtering said additional line using at least one of said adjacent lines of said given field; wherein said vertically filtering means include means for multiplexing said additional line and said adjacent lines of said given field to form a field of an interlaced picture signal having a doubled line number.

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6. Apparatus for processing a line and field sequentially assembled picture signal, comprising:  
means for performing a motion compensated interpolation to obtain an additional line between two adjacent lines of a given field from picture information of at least on neighboring field; and  
means for vertically filtering said additional line using at least one of said adjacent lines of said given field; wherein said vertically filtering means include means for processing said additional line and said adjacent lines of said given field to form a non-interlaced picture signal.

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## APPENDIX B

## APPENDIX B - LIST OF ALLEGED INFRINGING LG PRODUCTS

Televisions

32LE5300

32LG60

32LG70

37LG60

42LD520

42LD550

42LE5300

42LE5350

42LE5400

42LG60

42LG70

42LGX

42LK520

42LV520

42LV5400

42LV5500

47LD500

47LD520

47LD650

47LE5350

47LE5400

47LG60

47LG70

47LG90

47LGCX

47LK520

47LV5500

52LD550

52LG60

52LG70

55LD520

55LD650

55LE5400

55LE5500

55LK520

55LV5500

60LD550

32LD520

32LD550

Projectors

CF3D

CF181D

32LE5400  
32LH40  
37LE5300  
37LH40  
37LH55  
42LBX  
42LE5500  
42LE7300  
42LG60  
42LGX  
42LH40  
42LH50  
42LH55  
42LH90  
42SL80  
42SL90  
46LD550  
47LBX  
47LE5500  
47LE7300  
47LE7500  
47LG60  
47LH40  
47LH50  
47LH55  
47LH85  
47LH90  
47LX6500  
47LX9500  
47SL80  
47SL90  
52LBX  
52LG60  
55LE7300  
55LE7500  
55LE8500  
55LH40  
55LH50  
55LH55  
55LH85  
55LH90  
55LHX  
55LX6500  
55LX9500

APPENDIX C- LIST OF ALLEGED INFRINGING TOSHIBA PRODUCTS

Televisions

55G310U  
55G300U  
55HT1U  
55SL417U  
55SL412U  
55S41U  
55TL515U  
55UL605U  
55UX600U  
55VX700U  
55WX800U  
  
47TL515U  
  
46G310U  
46G300U  
46SL417U  
46SL412U  
46UL605U  
46UX600U  
46VX700U  
46WX800U  
  
42SL417U  
42TL515U  
  
40G300U  
40UL605U  
40UX600U  
  
32TL515U

APPENDIX D - LIST OF ALLEGED INFRINGING MITSUBISHI PRODUCTS

Televisions

WD-92840

WD-82840

WD-82838

WD-82740

WD-82738

WD-73840

WD-73838

WD-73740

WD-73738

WD-73640

WD-73C11

WD-73638

WD-73C10

WD-65838

WD-65738

WD-65638

WD-65C11

WD-60738

WD-60638

WD-60C10

L75-A94

L75-A91

LT-55265

LT-55164

LT-55154

LT-52153

LT-46265

LT-46164

LT-46153

LT-40164

LT-40153

## APPENDIX E - LIST OF ALLEGED INFRINGING VIZIO PRODUCTS

Televisions

XVT3D650SV

E550VA

E550VL

E551VA

E551VL

M550NV

M550SV

VF550M

VF550XVT1A

VF551XVT

VF552XVT

XVT3D554SV

XVT553SV

E3D470VX

E470VA

E470VL

E472VL

M470NV

M470SV

M470VT

M470VT

SV470M

SV470XVT1A

SV471XVT

SV472XVT

VL470M

VT470M

XVT3D474SV

XVT472SV

XVT473SV

E3D420VX

E420VA

E420VL

E421VA

E421VL

E421VO

E422VA

M3D420SR

M420NV

M420SR

M420SV

M420VT

M421NV  
M421VT  
SV420M  
SV420XVT  
SV421XVT  
SV422XVT  
VL420M  
VT420M  
XVT3D424SV  
XVT3D474SV  
XVT423SV  
  
E370VA  
E371VA  
M370VT  
SV370XVT  
XVT373SV  
  
SV320XVT  
XVT323SV

APPENDIX F - LIST OF ALLEGED INFRINGING SHARP ELECTRONICS CORP.  
PRODUCTS

Televisions

LC-70LE735U  
LC-70LE734U  
LC-70LE733U  
LC-70LE732U

LC-60LE925UN  
LC-60LE835U  
LC-60LE832U  
LC-60LE831U  
LC-60LE830U  
LC-60LE633U  
LC-60LE632U  
LC-60E88UN

LC-52LE835U  
LC-52LE830U

LC-46LE835U  
LC-46LE832U  
LC-46LE830U

LC-40LE835U  
LC-40LE830U